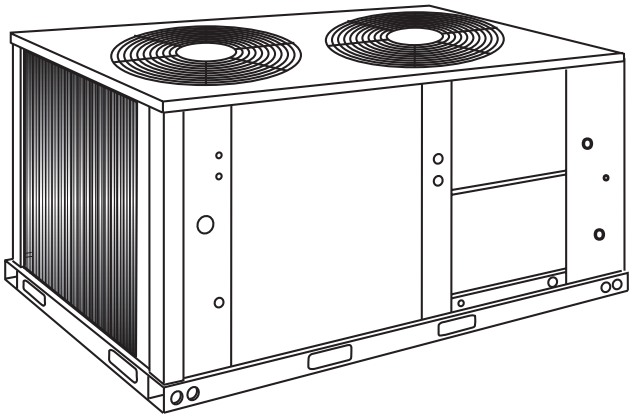

# SPLIT-SYSTEM AIR-COOLED CONDENSING UNITS

**H3CE180 & 240**

**15 AND 20 NOMINAL TONS**

## DESCRIPTION

These outdoor condensing units are completely assembled, piped and wired at the factory to provide one-piece shipment and rigging. Each unit is pressurized with a holding charge of refrigerant-22 for storage and/or shipping.

The compact design, clean styling, and quiet operation make these condensing units suitable for almost any outdoor location. On rooftops . . . because they weigh much less than a single package unit of similar capacity and are much easier to rig and support. At ground level . . . because their ample sub-cooling capacity allows them to be located 18 meters (60 feet) below the evaporator coil.

All sheet metal parts are constructed of commercial grade (G90) galvanized steel. Before painting, each part is thoroughly cleaned to remove any grease or dirt from its surfaces. The external parts are then coated a "desert sand" powder paint to assure a quality finish for many years. This coating system has passed the 750 hour, salt spray test per ASTM Standard B117.

All models include a 1-year limited warranty on the complete unit. The compressor carries an additional 4-year warranty.

A matching line of Evaporator Blower units is also offered to meet your precise capacity and air handling requirements.

## FEATURES

- Condenser coil constructed of rifled copper tubes and louvered aluminum fins for durability and long lasting efficient operation.
- Permanently attached base rails with fork lift slots and lifting holes. This design allows for 3-way fork lift access and overhead rigging.
- Both high and low pressure controls.
- Solid state motor protection to prevent the compressor from operating at an unsafe condition.
- Ball bearing condenser fan motors with 5/8 inch shafts.
- Color-coded power and control wiring for easier service and troubleshooting.
- Anti-short cycle timer to protect the compressor.
- A lockout circuit to prevent the unit from cycling on safety control.
- A 24-volt temperature control circuit.
- Standard unit low ambient operation to (35°F).
- A filter-drier (shipped in the unit's compressor compartment for field installation near the evaporator coil).
- Service valves with a back-seating access port for pressure testing the system. Copper stub-outs are factory mounted on the suction and liquid service valves to simplify the field piping connections.
- Separate panel for easy access to the control box without affecting air flow across the condenser coil.
- Exterior access to service pressure port connections.
- Packaging suitable for outdoor storage.
- An optional Phenolic coating is available where the condenser coils are fully dipped in a phenolic coating process to provide longer life in corrosive conditions.

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## ARI RATINGS[1]

## UNIT APPLICATION DATA

| | | |
|---|---|---|
| Voltage Variation[1] Min. / Max. | 208/230-3-60 | 187 / 252 |
| | 460-3-60 | 432 / 504 |
| | 575-3-60 | 540 / 630 |
| Ambient Air on Condenser Coil Min. / Max. | | 35°F[2] / 115°F |
| Ambient Air on Condenser Coil Min. / Max. with Head Pressure Control | | 0 - 115°F |

1 Utilization range "A" in accordance with ARI Standard 110.
2. The minimum allowed ambient temperature for mechanical cooling without the head pressure control accessory installed must be raised if the indoor air flow is less than the minimum value given in the capacity tables.

## PART LOADCAPACITY & EFFICIENCY

## PHYSICAL DATA

| Model Size (Mbh) | Compressor[1] | | Condenser | | | | | | | | | Unit Weight (Lbs.) | | Charge, (Refrigerant-22) Lbs.-Oz. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 24" Fan (Propeller) | | | Fan Motor[2] | | | | Coil | | | | | |
| | Rating (Tons) | Cap. (Stg's.) | Qty. | Blades/ Pitch (Deg.) | Nom. CFM | Qty. | HP | RPM | Rotation | Fins per inch | Rows Deep | Ship. | Oper. | Holding[3] | Oper.4 |
| 180 | 15 | 2 | 2 | 3/32 | 10,800 | 2 | 1 | 1100 | CCWLE | 20 | 2 | 920 | 930 | 2 - 0 | 24 - 12 |
| 240 | 20 | 2 | 2 | 3/32 | 11,300 | 2 | 1 | 1100 | CCWLE | 20 | 2 | 970 | 990 | 2 - 0 | 32 - 13 |

[1]Compressor set consists of two Copeland scroll compressors manifolded into a single refrigerant circuit.
[2] The ball bearing, 48 frame, single phase condenser fan motor have internal protection are directly connected to the condenser fans. Motor rotation is counterclockwise when viewing the lead end,which is opposite the shaft end.
[3] Holding charge is the amount in the unit as shipped from the factory.
[4] Operating refrigerant charge is for the condensing unit and the matching York air handler, but does not include the charge in the interconnecting piping. See the Refrigerant Line Charge Table to determine the additional refrigerant charge required for interconnecting piping.

## ELECTRICAL DATA

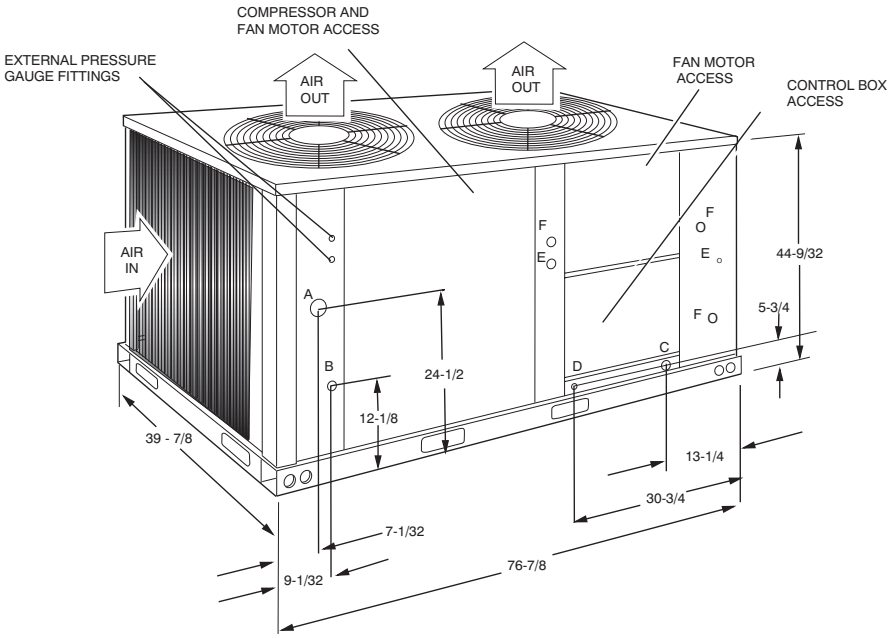
| Model | Unit Power Supply | Compressor | | | Condenser Fan Motor | | | Unit | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Qty | RLA | LRA | Qty | HP | FLA | Minimum Circuit Ampacity (Amps) | Maximum Fuse Size[1] (Amps) | Minimum Disconnect Size[2] (Amps) |
| H3CE180A25 | 208/230/3/60 | 2 | 26.4 | 189 | 2 | 1 | 5.0 | 69.4 | 90 | 100 |
| H3CE180A46 | 460/3/60 | 2 | 13.9 | 94 | 2 | 1 | 2.6 | 36.5 | 50 | 60 |
| H3CE180A58 | 575/3/60 | 2 | 10.1 | 74 | 2 | 1 | 2.0 | 26.7 | 35 | 30 |
| H3CE240A25 | 208/230/3/60 | 2 | 37.4 | 278 | 2 | 1 | 5.0 | 94.2 | 125 | 100 |
| H3CE240A46 | 460/3/60 | 2 | 18.4 | 127 | 2 | 1 | 2.6 | 46.6 | 60 | 60 |
| H3CE240A58 | 575/3/60 | 2 | 15.2 | 100 | 2 | 1 | 2.0 | 38.2 | 50 | 60 |

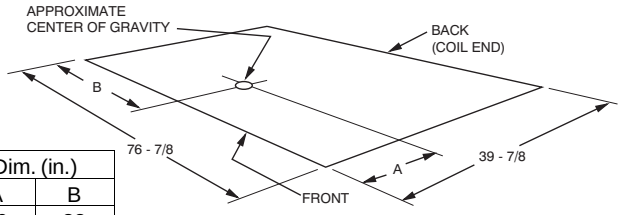
1. Dual element, time delay type.
2. Refer to NEC/NFPA No. 70, Articles 440-11,12 for information on minimum disconnect sizing.
3. The 208-230 V compressors and motors use a single tap for the entire range of voltages. The 208/230 V to 24 V transformers have different taps for 208 and 230 V.

## FIELD-INSTALLED ACCESSORIES

- 0°F LOW AMBIENT - A single phase condenser fan motor and head pressure control to reduce its speed maintain stable system operation at ambient temperatures down to 0°F.
- Coil Guard - A decorative coil guard provides an additional level of protection for the condenser coils.

## UNIT DIMENSIONS & CLEARANCES




| Unit | Dim. (in.) | |
|---|---|---|
| | A | B |
| 15 Ton | 16 | 32 |
| 20 Ton | 16 | 32 |

**CENTER OF GRAVITY**

All dimensions are in inches. They are subject to change without notice. Certified dimensions will be provided upon request.

| Connection Entry | | Connection Size | |
|---|---|---|---|
| | | 15 Ton | 20 Ton |
| Suction Line | A | 1-5/8 ID | 2-1/8 ID |
| Liquid Line | B | 5/8 ID | 5/8 ID |
| Power Wiring | C | 2-1/8 KO | 2-1/8KO |
| Control Wiring | D | 7/8 KO | 7/8 KO |
| Accessory Wiring | E | 7/8 KO | 7/8 KO |
| Accessory Wiring | F | 1-3/8 KO | 1-3/8 KO |

## CLEARANCES

| | |
|---|---|
| Overhead (Top)[1] | 120" |
| Front (Piping and Access Panels) | 30" |
| Left Side | 24" |
| Right Side | 24" |
| Rear | 24" |
| Bottom[2] | 0" |

1Units must be installed outdoors. Overhanging structures or shrubs should not obstruct condenser air discharge.
2Adequate snow clearance must be provided if winter operation is expected.

## CONDENSING UNIT ONLY COOLING CAPACITIES AND POWER REQUIREMENTS

| Model | Compressor Suction | | Ambient Temperature Entering Condenser Coil (°F) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 65 | | 75 | | 85 | | 95 | | 105 | | 115 | |
| | Pressure (psig) | Saturated Temp (°F) | MBH[1] | kW[2] | MBH | kW | MBH | kW | MBH | kW | MBH | kW | MBH | kW |
| 180 | 54.9 | 30 | 165 | 12.3 | 157 | 13.4 | 150 | 14.8 | 142 | 16.3 | 134 | 18.1 | 126 | 19.9 |
| | 61.6 | 35 | 181 | 12.5 | 172 | 13.6 | 164 | 15.0 | 156 | 16.5 | 147 | 18.3 | 138 | 20.2 |
| | 68.5 | 40 | 196 | 12.7 | 188 | 13.9 | 179 | 15.3 | 170 | 16.7 | 160 | 18.6 | 151 | 20.4 |
| | 76.0 | 45 | 212 | 12.9 | 204 | 14.1 | 194 | 15.5 | 184 | 17.0 | 174 | 18.9 | 164 | 20.8 |
| | 84.0 | 50 | 231 | 13.2 | 220 | 14.3 | 210 | 15.8 | 199 | 17.3 | 188 | 19.1 | 177 | 21.0 |
| 240 | 54.9 | 30 | 228 | 17.3 | 217 | 19.2 | 206 | 21.1 | 195 | 23.4 | 183 | 25.9 | 172 | 28.5 |
| | 61.6 | 35 | 248 | 17.7 | 237 | 19.6 | 225 | 21.5 | 213 | 23.8 | 200 | 26.4 | 188 | 29.0 |
| | 68.5 | 40 | 269 | 18.1 | 257 | 20 | 244 | 21.9 | 231 | 24.3 | 218 | 26.9 | 204 | 29.6 |
| | 76.0 | 45 | 291 | 18.5 | 277 | 20.5 | 264 | 22.4 | 250 | 24.8 | 236 | 27.5 | 222 | 30.3 |
| | 84.0 | 50 | 313 | 19.0 | 299 | 21 | 284 | 23.0 | 269 | 25.3 | 254 | 28.1 | 239 | 30.9 |

1. Capacities are gross ratings.
2. Power is for the condensing unit only.

# SYSTEM GROSS COOLING CAPACITIES AND POWER REQUIREMENTS H3CE180 WITH K3EU180

85 °F Air Entering Condenser

| Air Ent. Evaporator | | Power Input | Air Temperature Entering Evaporator, Dry Bulb | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 86 | | 80 | | 74 | | 68 | |
| CFM | WB | kW | Total | Sens | Total | Sens | Total | Sens | Total | Sens |
| 7200 | 72 | 15.6 | 205 | 154 | 204 | 115 | 201 | 77 | | |
| | 67 | 15.4 | 197 | 188 | 191 | 149 | 188 | 110 | 185 | 71 |
| | 62 | 15.3 | 197 | 197 | 183 | 182 | 176 | 144 | 174 | 106 |
| | 57 | 15.3 | 197 | 197 | 182 | 182 | 172 | 172 | 163 | 140 |
| 6600 | 72 | 15.5 | 203 | 148 | 202 | 112 | 199 | 75 | | |
| | 67 | 15.4 | 193 | 180 | 189 | 143 | 187 | 108 | 184 | 70 |
| | 62 | 15.2 | 193 | 193 | 181 | 174 | 174 | 139 | 172 | 103 |
| | 57 | 15.2 | 193 | 193 | 181 | 181 | 169 | 169 | 160 | 134 |
| 6000 | 72 | 15.5 | 201 | 142 | 200 | 108 | 197 | 74 | | |
| | 67 | 15.3 | 189 | 172 | 187 | 137 | 185 | 105 | 182 | 69 |
| | 62 | 15.2 | 188 | 188 | 177 | 168 | 172 | 134 | 170 | 101 |
| | 57 | 15.2 | 188 | 188 | 177 | 177 | 164 | 162 | 158 | 129 |
| 5400 | 72 | 15.5 | 199 | 135 | 197 | 105 | 195 | 72 | | |
| | 67 | 15.3 | 186 | 163 | 184 | 131 | 182 | 101 | 180 | 68 |
| | 62 | 15.1 | 183 | 183 | 173 | 160 | 170 | 128 | 168 | 98 |
| | 57 | 15.1 | 183 | 183 | 172 | 172 | 160 | 155 | 156 | 124 |
| 4800 | 72 | 15.4 | 196 | 129 | 194 | 101 | 192 | 71 | | |
| | 67 | 15.2 | 183 | 154 | 181 | 125 | 179 | 98 | 177 | 67 |
| | 62 | 15.0 | 177 | 177 | 169 | 150 | 166 | 122 | 165 | 95 |
| | 57 | 15.0 | 177 | 177 | 166 | 166 | 156 | 147 | 153 | 118 |

95 °F Air Entering Condenser

| Power Input | Air Temperature Entering Evaporator, Dry Bulb | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 86 | | 80 | | 74 | | 68 | |
| kW | Total | Sens | Total | Sens | Total | Sens | Total | Sens |
| 17.2 | 198 | 151 | 196 | 112 | 193 | 74 | | |
| 16.9 | 191 | 185 | 183 | 145 | 182 | 108 | 179 | 68 |
| 16.9 | 191 | 191 | 179 | 179 | 170 | 142 | 168 | 103 |
| 16.9 | 191 | 191 | 179 | 179 | 167 | 167 | 157 | 136 |
| 17.2 | 196 | 145 | 194 | 109 | 192 | 73 | | |
| 16.9 | 187 | 177 | 182 | 140 | 180 | 105 | 177 | 67 |
| 16.8 | 187 | 187 | 175 | 172 | 168 | 136 | 166 | 100 |
| 16.8 | 187 | 187 | 175 | 175 | 164 | 164 | 155 | 132 |
| 17.1 | 194 | 139 | 192 | 106 | 190 | 71 | | |
| 16.9 | 184 | 170 | 180 | 134 | 178 | 102 | 175 | 66 |
| 16.8 | 183 | 183 | 171 | 164 | 166 | 131 | 164 | 98 |
| 16.8 | 183 | 183 | 171 | 171 | 159 | 158 | 152 | 126 |
| 17.1 | 192 | 133 | 190 | 102 | 188 | 70 | | |
| 16.9 | 180 | 160 | 178 | 129 | 176 | 99 | 173 | 66 |
| 16.7 | 178 | 178 | 167 | 156 | 163 | 125 | 162 | 95 |
| 16.7 | 178 | 178 | 167 | 167 | 155 | 152 | 150 | 121 |
| 17.0 | 189 | 126 | 187 | 98 | 185 | 68 | | |
| 16.8 | 177 | 151 | 175 | 122 | 173 | 95 | 170 | 65 |
| 16.6 | 172 | 172 | 163 | 147 | 160 | 119 | 159 | 92 |
| 16.6 | 172 | 172 | 161 | 161 | 151 | 143 | 147 | 115 |

105 °F Air Entering Condenser

| Air Ent. Evaporator | | Power Input | Air Temperature Entering Evaporator, Dry Bulb | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 86 | | 80 | | 74 | | 68 | |
| CFM | WB | kW | Total | Sens | Total | Sens | Total | Sens | Total | Sens |
| 7200 | 72 | 19.0 | 190 | 148 | 188 | 109 | 185 | 72 | | |
| | 67 | 18.7 | 184 | 181 | 176 | 142 | 174 | 104 | 171 | 65 |
| | 62 | 18.7 | 184 | 184 | 172 | 172 | 163 | 139 | 161 | 100 |
| | 57 | 18.7 | 184 | 184 | 172 | 172 | 161 | 161 | 151 | 133 |
| 6600 | 72 | 19.0 | 188 | 142 | 186 | 106 | 184 | 70 | | |
| | 67 | 18.7 | 180 | 173 | 175 | 137 | 172 | 102 | 170 | 65 |
| | 62 | 18.6 | 180 | 181 | 169 | 167 | 161 | 133 | 159 | 97 |
| | 57 | 18.6 | 180 | 181 | 169 | 169 | 158 | 158 | 149 | 129 |
| 6000 | 72 | 18.9 | 186 | 136 | 184 | 102 | 182 | 69 | | |
| | 67 | 18.7 | 177 | 166 | 173 | 131 | 171 | 99 | 168 | 64 |
| | 62 | 18.6 | 176 | 176 | 165 | 161 | 159 | 128 | 158 | 95 |
| | 57 | 18.6 | 176 | 176 | 165 | 166 | 155 | 155 | 146 | 123 |
| 5400 | 72 | 18.9 | 184 | 129 | 183 | 99 | 180 | 67 | | |
| | 67 | 18.6 | 173 | 157 | 171 | 125 | 169 | 96 | 166 | 63 |
| | 62 | 18.5 | 172 | 172 | 161 | 153 | 157 | 122 | 155 | 92 |
| | 57 | 18.5 | 172 | 172 | 161 | 161 | 150 | 148 | 144 | 118 |
| 4800 | 72 | 18.9 | 181 | 123 | 180 | 96 | 177 | 66 | | |
| | 67 | 18.6 | 170 | 148 | 168 | 119 | 166 | 92 | 164 | 62 |
| | 62 | 18.4 | 166 | 166 | 157 | 144 | 154 | 116 | 153 | 89 |
| | 57 | 18.4 | 166 | 166 | 156 | 156 | 146 | 140 | 142 | 112 |

115 °F Air Entering Condenser

| Power Input | Air Temperature Entering Evaporator, Dry Bulb | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 86 | | 80 | | 74 | | 68 | |
| kW | Total | Sens | Total | Sens | Total | Sens | Total | Sens |
| 21.0 | 182 | 146 | 180 | 106 | 177 | 69 | | |
| 20.8 | 177 | 177 | 169 | 140 | 166 | 101 | 163 | 63 |
| 20.7 | 177 | 177 | 166 | 166 | 156 | 135 | 153 | 96 |
| 20.7 | 177 | 177 | 166 | 166 | 155 | 155 | 144 | 129 |
| 21.0 | 180 | 139 | 178 | 103 | 175 | 67 | | |
| 20.7 | 173 | 170 | 167 | 134 | 165 | 98 | 162 | 62 |
| 20.6 | 173 | 173 | 163 | 163 | 155 | 130 | 152 | 94 |
| 20.6 | 173 | 173 | 163 | 163 | 152 | 152 | 142 | 125 |
| 21.0 | 178 | 133 | 176 | 99 | 174 | 66 | | |
| 20.7 | 170 | 162 | 165 | 128 | 163 | 95 | 161 | 61 |
| 20.6 | 170 | 170 | 159 | 157 | 152 | 124 | 151 | 92 |
| 20.6 | 170 | 170 | 159 | 159 | 149 | 149 | 141 | 120 |
| 20.9 | 176 | 127 | 175 | 96 | 172 | 65 | | |
| 20.6 | 167 | 154 | 163 | 122 | 161 | 92 | 159 | 60 |
| 20.5 | 166 | 166 | 155 | 149 | 150 | 119 | 149 | 89 |
| 20.5 | 166 | 166 | 155 | 155 | 144 | 144 | 138 | 115 |
| 20.9 | 174 | 120 | 172 | 92 | 170 | 63 | | |
| 20.6 | 163 | 145 | 161 | 116 | 159 | 89 | 157 | 59 |
| 20.4 | 161 | 161 | 152 | 142 | 148 | 113 | 146 | 86 |
| 20.4 | 161 | 161 | 151 | 151 | 140 | 138 | 136 | 109 |

NOTES:

1. Capacities are gross MBH.
2. Temperatures are expressed in °F.
3. Power (kW) is for the condensing unit only and corresponds to 80 °F dry bulb air temperature entering the evaporator.
4. Air handler power is not included.
5. Shaded areas represent dry coil operation.

All Sensible Capacity

Blower Motor KW x $\frac{3.415 \text{ MBH}}{\text{KW}}$ = Blower Motor Heat (MBH)

# SYSTEM GROSS COOLING CAPACITIES AND POWER REQUIREMENTS - Cont'd.
# H3CE240 WITH L4EU240

85 °F Air Entering Condenser

| Air Ent. Evaporator | | Power Input | Air Temperature Entering Evaporator, Dry Bulb | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 86 | | 80 | | 74 | | 68 | |
| CFM | WB | kW | Total | Sens | Total | Sens | Total | Sens | Total | Sens |
| 9600 | 72 | 22.8 | 279 | 204 | 277 | 153 | 273 | 104 | | |
| | 67 | 22.3 | 265 | 251 | 259 | 197 | 257 | 148 | 252 | 96 |
| | 62 | 22.2 | 265 | 265 | 248 | 245 | 240 | 192 | 237 | 142 |
| | 57 | 22.2 | 265 | 265 | 248 | 248 | 237 | 237 | 221 | 185 |
| 8800 | 72 | 22.7 | 277 | 196 | 274 | 149 | 270 | 102 | | |
| | 67 | 22.3 | 261 | 240 | 257 | 190 | 254 | 144 | 250 | 95 |
| | 62 | 22.0 | 261 | 261 | 243 | 234 | 237 | 185 | 235 | 138 |
| | 57 | 22.0 | 261 | 261 | 243 | 243 | 232 | 232 | 218 | 179 |
| 8000 | 72 | 22.6 | 274 | 188 | 271 | 144 | 267 | 100 | | |
| | 67 | 22.2 | 257 | 229 | 254 | 182 | 251 | 140 | 247 | 93 |
| | 62 | 21.9 | 257 | 257 | 239 | 224 | 234 | 178 | 232 | 135 |
| | 57 | 21.9 | 257 | 257 | 239 | 239 | 221 | 216 | 216 | 173 |
| 7200 | 72 | 22.5 | 270 | 180 | 268 | 140 | 264 | 98 | | |
| | 67 | 22.1 | 253 | 218 | 250 | 175 | 247 | 136 | 244 | 92 |
| | 62 | 21.7 | 250 | 250 | 234 | 213 | 230 | 171 | 228 | 131 |
| | 57 | 21.7 | 250 | 250 | 234 | 234 | 217 | 207 | 212 | 166 |
| 6400 | 72 | 22.4 | 266 | 171 | 263 | 135 | 260 | 96 | | |
| | 67 | 22.0 | 247 | 205 | 246 | 167 | 243 | 131 | 240 | 91 |
| | 62 | 21.6 | 242 | 242 | 229 | 202 | 226 | 163 | 224 | 127 |
| | 57 | 21.6 | 242 | 242 | 227 | 227 | 211 | 196 | 208 | 159 |

95 °F Air Entering Condenser

| Power Input | Air Temperature Entering Evaporator, Dry Bulb | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 86 | | 80 | | 74 | | 68 | |
| kW | Total | Sens | Total | Sens | Total | Sens | Total | Sens |
| 25.2 | 268 | 200 | 266 | 149 | 262 | 100 | | |
| 24.8 | 255 | 246 | 249 | 193 | 246 | 143 | 242 | 92 |
| 24.7 | 255 | 255 | 244 | 244 | 230 | 187 | 227 | 137 |
| 24.6 | 255 | 255 | 244 | 244 | 229 | 229 | 212 | 181 |
| 25.1 | 266 | 192 | 264 | 145 | 259 | 98 | | |
| 24.7 | 252 | 237 | 247 | 186 | 244 | 140 | 240 | 91 |
| 24.5 | 252 | 252 | 235 | 231 | 228 | 181 | 225 | 134 |
| 24.5 | 252 | 252 | 235 | 235 | 224 | 224 | 210 | 174 |
| 25.1 | 263 | 184 | 261 | 141 | 257 | 96 | | |
| 24.6 | 247 | 225 | 244 | 179 | 241 | 136 | 237 | 90 |
| 24.4 | 247 | 247 | 230 | 220 | 225 | 174 | 223 | 130 |
| 24.4 | 247 | 247 | 230 | 230 | 215 | 213 | 207 | 169 |
| 25.0 | 260 | 176 | 257 | 136 | 254 | 94 | | |
| 24.5 | 243 | 214 | 241 | 171 | 238 | 132 | 234 | 89 |
| 24.2 | 242 | 242 | 225 | 208 | 222 | 167 | 219 | 127 |
| 24.2 | 242 | 242 | 225 | 225 | 209 | 203 | 204 | 162 |
| 24.9 | 256 | 168 | 253 | 131 | 250 | 92 | | |
| 24.4 | 239 | 202 | 237 | 163 | 234 | 127 | 230 | 87 |
| 24.0 | 234 | 234 | 220 | 197 | 218 | 160 | 215 | 123 |
| 24.0 | 234 | 234 | 220 | 220 | 203 | 192 | 200 | 155 |

105 °F Air Entering Condenser

| Air Ent. Evaporator | | Power Input | Air Temperature Entering Evaporator, Dry Bulb | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 86 | | 80 | | 74 | | 68 | |
| CFM | WB | kW | Total | Sens | Total | Sens | Total | Sens | Total | Sens |
| 9600 | 72 | 27.9 | 257 | 196 | 255 | 145 | 250 | 96 | | |
| | 67 | 27.4 | 246 | 242 | 239 | 189 | 236 | 139 | 231 | 88 |
| | 62 | 27.4 | 246 | 246 | 235 | 235 | 220 | 183 | 218 | 132 |
| | 57 | 27.4 | 246 | 246 | 235 | 235 | 220 | 220 | 203 | 176 |
| 8800 | 72 | 27.9 | 255 | 188 | 252 | 141 | 248 | 94 | | |
| | 67 | 27.4 | 242 | 232 | 237 | 182 | 234 | 135 | 229 | 87 |
| | 62 | 27.2 | 242 | 242 | 231 | 231 | 218 | 176 | 216 | 129 |
| | 57 | 27.2 | 242 | 242 | 231 | 231 | 216 | 216 | 201 | 170 |
| 8000 | 72 | 27.8 | 252 | 180 | 250 | 136 | 246 | 92 | | |
| | 67 | 27.3 | 238 | 221 | 234 | 174 | 231 | 131 | 227 | 86 |
| | 62 | 27.1 | 238 | 238 | 221 | 214 | 215 | 169 | 213 | 126 |
| | 57 | 27.1 | 238 | 238 | 221 | 221 | 211 | 211 | 198 | 164 |
| 7200 | 72 | 27.7 | 249 | 172 | 247 | 132 | 243 | 90 | | |
| | 67 | 27.2 | 234 | 210 | 231 | 166 | 228 | 127 | 224 | 85 |
| | 62 | 26.9 | 234 | 234 | 217 | 204 | 212 | 162 | 210 | 123 |
| | 57 | 26.9 | 234 | 234 | 217 | 217 | 202 | 199 | 195 | 157 |
| 6400 | 72 | 27.6 | 245 | 163 | 243 | 127 | 239 | 88 | | |
| | 67 | 27.1 | 229 | 197 | 227 | 159 | 224 | 123 | 221 | 84 |
| | 62 | 26.7 | 226 | 226 | 211 | 192 | 209 | 155 | 207 | 119 |
| | 57 | 26.7 | 226 | 226 | 211 | 211 | 196 | 188 | 192 | 150 |

115 °F Air Entering Condenser

| Power Input | Air Temperature Entering Evaporator, Dry Bulb | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 86 | | 80 | | 74 | | 68 | |
| kW | Total | Sens | Total | Sens | Total | Sens | Total | Sens |
| 31.0 | 245 | 191 | 243 | 141 | 238 | 93 | | |
| 30.4 | 241 | 241 | 228 | 185 | 225 | 134 | 220 | 84 |
| 30.4 | 241 | 241 | 226 | 226 | 210 | 179 | 207 | 128 |
| 30.4 | 241 | 241 | 226 | 226 | 210 | 210 | 194 | 172 |
| 30.9 | 243 | 184 | 241 | 136 | 237 | 91 | | |
| 30.3 | 232 | 227 | 226 | 178 | 223 | 131 | 219 | 83 |
| 30.2 | 232 | 232 | 221 | 221 | 208 | 172 | 206 | 125 |
| 30.2 | 232 | 232 | 221 | 221 | 207 | 207 | 192 | 166 |
| 30.8 | 241 | 177 | 238 | 132 | 234 | 89 | | |
| 30.3 | 228 | 217 | 223 | 170 | 220 | 127 | 216 | 82 |
| 30.1 | 228 | 228 | 217 | 217 | 206 | 165 | 203 | 122 |
| 30.1 | 228 | 228 | 217 | 217 | 203 | 203 | 189 | 159 |
| 30.7 | 238 | 168 | 235 | 128 | 232 | 87 | | |
| 30.2 | 223 | 205 | 220 | 162 | 218 | 123 | 214 | 81 |
| 29.9 | 223 | 223 | 208 | 199 | 203 | 158 | 201 | 118 |
| 29.9 | 223 | 223 | 211 | 211 | 198 | 198 | 187 | 152 |
| 30.6 | 234 | 159 | 232 | 123 | 229 | 85 | | |
| 30.1 | 219 | 193 | 217 | 154 | 214 | 119 | 211 | 80 |
| 29.7 | 218 | 218 | 202 | 187 | 199 | 150 | 197 | 114 |
| 29.7 | 218 | 218 | 202 | 202 | 188 | 182 | 183 | 146 |

NOTES:

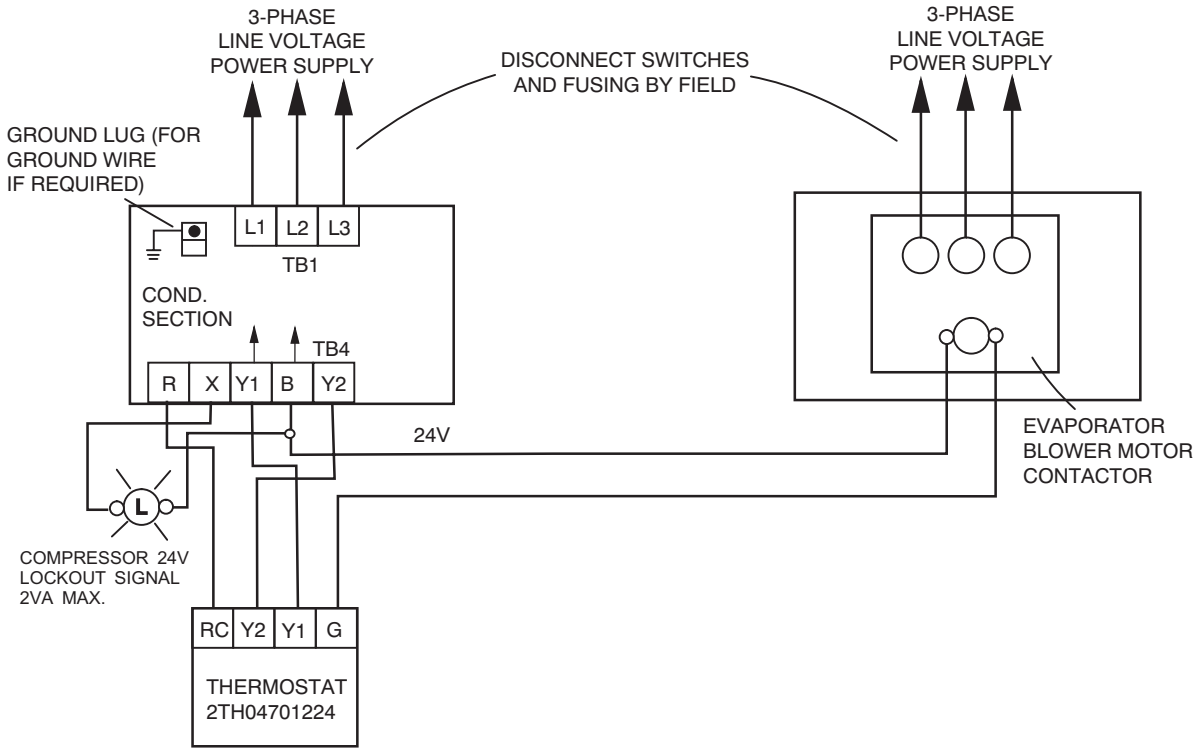
1. Capacities are gross MBH.
2. Temperatures are expressed in °F.
3. Power (kW) is for the condensing unit only and corresponds to 80 °F dry bulb air temperature entering the evaporator.
4. Air handler power is not included.
5. Shaded areas represent dry coil operation.

All Sensible Capacity

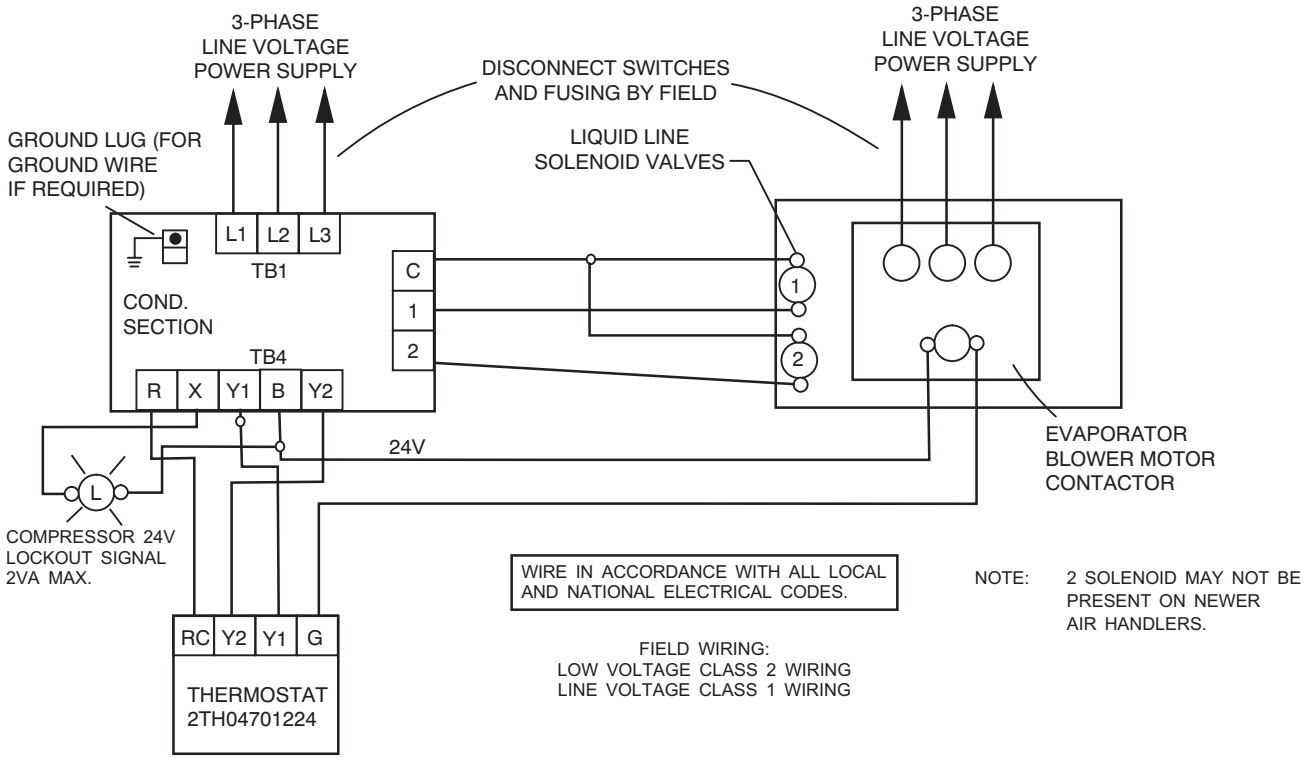
Blower Motor KW x $\frac{3.415 \text{ MBH}}{\text{KW}}$ = Blower Motor Heat (MBH)

# FIELD WIRING

## H3CE180/K4EU180




## H3CE240/L4EU240



## SUCTION LINE DATA[1,2]

| Model Designation | | Nominal Capacity (Tons) | Refrigerant Flow Rate[3] (Lbs./Min.) | Type L Copper Tubing (Inches O.D.) | Refrigerant Gas Velocity (FT./Min.) | Friction Loss[4,5] (PSI/100 Ft.) |
|---|---|---|---|---|---|---|
| HCE180 | Full Capacity | 15 | 45 | 1-5/8<br>2-1/8 | 2300<br>1360 | 2.5<br>0.6 |
| | Part Capacity | 8-1/2 | 25.5 | 1-5/8<br>2-1/8 | 1150<br>770[6] | 0.7<br>0.2 |
| HCE240 | Full Capacity | 20 | 60 | 1-5/8<br>2-1/8<br>2-5/8 | 3120<br>1800<br>1200 | 4.3<br>1.2<br>0.4 |
| | Part Capacity | 10 | 30 | 1-5/8<br>2-1/8<br>2-5/8 | 1560<br>900[6]<br>600[6] | 1.2<br>0.3<br>0.1 |

1All horizontal suction lines should be pitched at least 1 inch every 20 feet in the direction of the refrigerant flow to aid the return of oil to the compressor.
[2]Every vertical suction riser greater than 25 feet in height should have a "P" trap at the bottom to facilitate the return of oil to the compressor. Use short radius fittings for these traps.
[3]Based on Refrigerant-22 at the nominal capacity of the condensing unit, a suction temperature of 40°F and a liquid temperature of 105°F.
[4]Although suction lines should be sized for a friction loss equivalent to a 2°F change in saturation temperature (or approximately 3 psi), sizing the lines for the proper return of oil is more important.
[5]These friction losses do not include any allowances for valves or fittings.
[6]Since the refrigerant gas velocity may be too low to maintain good oil return up a vertical riser, use the next smaller size. The larger size may be used for horizontal runs for a smaller pressure drop.

## LIQUID LINE DATA

| Model | Nominal Capacity (Tons) | Refrigerant Flow Rate[1] (Lbs./Min.) | Type L Copper Tubing (Inches O.D.) | Pressure Drop[3] | |
|---|---|---|---|---|---|
| | | | | Friction[2] (PSI/100 Ft.) | Vertical Rise (PSI/Ft.) |
| HCE180 | 15 | 45 | 3/4<br>7/8 | 4.7<br>2.2 | 0.5 |
| HCE240 | 20 | 60 | 3/4<br>7/8 | 8.0<br>3.5 | 0.5 |

1Based on Refrigerant-22 at the nominal capacity of the condensing unit, a liquid temperature of 105°F and a suction temperature of 40°F.
[2]These friction losses do not include any allowances for a strainer, filter-drier, solenoid valve, isolation valve or fittings.
[3]The total pressure drop of the liquid line for both friction and vertical rise must not exceed 40 PSI. If the pressure drop exceeds 40 PSI, the liquid refrigerant could flash before it reaches the expansion valve. This flashing will not only cause erratic valve operation and poor system performance, but could also damage the expansion valve.

## REFRIGERANT-22 LINE CHARGE[1]

| | | |
|---|---|---|
| Liquid Line[2] Inches, O.D. | 5/8 | 0.113 lb./ft. |
| | 7/8 | 0.237 lb./ft. |
| Suction Line[2] Inches, O.D. | 1-5/8 | 0.018 lb./ft. |
| | 2-1/8 | 0.031 lb./ft. |
| | 2-5/8 | 0.047 lb./ft. |

NOTE: Add the operating charge of the condensing unit, the evaporator coil and the refrigerant lines to determine the total refrigerant charge of the system.

1Charges are based on 40°F suction temperature and a 105°F liquid temperature.
2Type "L" copper tubing.

# SEQUENCE OF OPERATION

## First Stage of Cooling

A call for cooling at terminal Y1 energizes relay RY1. Relay RY1 closes contacts RY1-1, energizing time delay relay 3TR. If time delay relay 3TR is satisfied as described below, it will energize its output terminal Y2, which is connected to compressor 1 control module terminal M1.

If the compressor 1 control module is satisfied as described below, it will apply power to terminal 7 of low or high pressure lock out relay (LOR) contacts. See a description of the LOR operation below. If the LOR coil is not energized (not locked out), the LOR contacts will be closed, energizing contactor 1M, which powers compressor 1 and condenser fan motor 1.

When 1M is energized on H3CE240 units, auxiliary contact 1M-AC2 is closed, powering terminal 1 for opening the stage 1 solenoid in air handlers which feature a stage 1 solenoid.

If the low ambient temperature switch TLA is closed, it will allow condenser fan 2 contactor 3M to energize. TLA opens as the temperature falls below 50 F and closes as the ambient rises above 60 F. TLA is used on the H3CE180, not the H3CE240.

## Anti-short Cycle Time Delay Relays 3TR and 4TR

Relay 3TR, which serves compressor 1 control, has an adjustable low voltage lock out which is set at 20V in the factory. The voltage applied to 3TR must be above its lock out setting and 5 minutes must elapse since the relay was last energized before it will energize its output terminal Y2. Relay 4TR is identical but it serves compressor 2 control.

## Compressor Control Module

If the compressor control module terminals L1 (or T1) and L2 (or T2) have 24 V applied and the internal compressor temperature lock out is inactive, the internal switch connecting M1 and M2 will be closed. M1 to M2 will open if one of the compressor's internal temperature sensors exceeds its limit. M1 to M2 stays open for 30 minutes after a internal temperature limit is exceeded. The 30 minute lock out may be reset prior to the 30 minutes expiring by removing power to the control module terminals L1 and L2. During normal operation, each compressor control module should always be powered at the L1 and L2 terminals, whether there is a call for cooling or not.

## Low or High Pressure Lock Out Operation

If the lock out circuit path is opened during a call for cooling, the lock out relay (LOR) coil will energize, opening LOR-1 contacts and disabling all compressor operation. The lock out circuit path is open if:

- the lock out relay contacts LOR-1 are open, OR
- the low pressure switch LP is open AND the low pressure switch bypass timer contacts 1TR-1 are open, OR
- the high pressure switch HP is open.

Once the LOR coil has been energized, it remains energized, locking out cooling operation until the call for cooling has been removed. When Y1 is returned to 0 volts, the LOR coil is no longer energized, closing the LOR-1 contacts and removing the lock out.

The low pressure bypass timer 1TR leaves the 1TR-1 contacts closed upon the start of a call for cooling until its 90 second (nominal) timer has expired. This bypasses the low pressure switch during start up. After the time delay has elapsed, 1TR-1 contacts are opened, once again allowing low pressure to trigger the lock out circuit if the low pressure switch opens.

During a lock out, the LOR-2 contacts are closed, energizing the X terminal on the terminal board for lighting a lock out warning light.

## Resetting the Lock Out

The lock out may be reset by:

- Turning the thermostat switch to OFF, or
- Momentarily adjusting the cooling set point to its maximum allowed value.

If the unit does not resume operation after the anti-short cycle timer expires or if it continues to lock out after resuming operation, call a service technician to diagnose and repair the unit.

*CAUTION: Repeatedly resetting the lock out may cause damage to the unit.*

## Second Stage of Cooling

The second stage of cooling will only be enabled if the first stage of cooling is on, closing auxiliary contact 1M-AC1. A call for cooling at terminal Y2 energizes Relay RY2, closing contact RY2-1, and energizing time delay relay 4TR if contact 1M-AC1 is closed. If time delay relay 4TR is satisfied, it will energize its output terminal Y2, which is connected to compressor 2 control module terminal M1.

If the compressor 2 control module is satisfied, it will energize time delay relay TDR. After 4 seconds, TDR energizes compressor 2 contactor 2M.When 2M is energized on H3CE240 units, auxiliary contact 2M-AC1 is closed, powering terminal 2 for opening the stage 2 solenoid in air handlers which feature a stage 2 solenoid.

# GUIDE SPECIFICATION - H*CE180 THROUGH 240

## I. General

A. Units shall be manufactured in a facility registered under the ISO 9002 manufacturing quality standard.

B. Units shall be UL listed to US and Canadian safety standards.

C. Unit shall be packaged to allow outdoor storage.

D. Warranty shall be a full year limited parts warranty on the complete unit with an additonal 4-year warranty on the compressor.

E. Unit shall be rated in accordance with ARI 360.

## II. Unit Cabinet

A. Cabinet shall be constructed of 18 gauge, zinc-coated steel, finished with a powder paint process capable of withstanding a minimum of 750 salt spray hours according to ASTM B117.

B. Cabinet screws shall comply with the ASTM B117 salt spray test for a minimum of 750 hours.

C. Panels shall be removable for easy access to all internal components during maintenance and service.

D. Cabinet shall feature a separate access panel for the controls so that unit airflow need not be disturbed during servicing.

E. Permanently attached base rails shall have 3-way fork lift access and lifting holes for ease of installation.

## III. Compressor

A. Compressors shall be hermetic scroll.

B. Compressor shall feature motor overload protection.

C. A crankcase heater shall keep refrigerant from diluting the compressor oil in the sump. Crankcase heater shall be field replaceable without removal of the charge.

D. Neoprene isolators shall be used to minimize the transmission of sound and vibration.

E. Compressor sets shall have two stages, with unloading accomplished through turning off one compressor.

## IV. Condenser and Fans

A. Fan motors shall be direct-drive with propeller-type condenser fans which discharge air vertically upward.

B. Fan motors shall have permanently lubricated ball-bearings for longer wear during start and stop cycles and shall have inherent overload protection.

C. Coil shall be constructed of rifled copper tubing mechanically expanded and bonded to louvered aluminum fins. Coil shall include an integral subcooler.

## V. Refrigeration Components - Refrigeration system shall contain the following:

- High and low pressure cut-outs
- Suction and liquid line service valves to ease installation and recovery of refrigerant
- External ports to accomodate gauge lines, allowing for easy servicing
- Filter drier shipped in unit for field installation
- Holding charge of R-22

## VI. Controls - Unit controls shall include:

A. 24 volt control circuit with terminal blocks.

B. Color-coded wiring for easy service and troubleshooting

C Independent line break thermal protection for the condenser fans.

D. 5 minute anti-short cycle timer to protect the compressor from frequent cycling.

E. Unit safety lockouts which automatically reset from the thermostat once the anti-short cycle timer is satisfied. Safety lockouts will also generate a 24 volt signal to the "X" terminal, allowing notification to the user via the thermostat fault light (if present). These safety lockouts shall include:

1. High refrigerant pressure
2. Low refrigerant pressure. Low refrigerant pressure shall be bypassed for the first 120 seconds (approximate) of operation to eliminate nuisance trips.

F. Compressor motor protection to automatically shutdown the unit in the event of motor overcurrent or low control voltage conditions. Unit shall automatically restart after satisfying the anti-short cycle timer.

G. Low ambient operation down to 35 °F without a low ambient kit. (Operation down to 0 °F with the optional low ambient kit.)

## VII. Electrical

A. Units shall be _____ volts, 3 phase, with a single power point connection.

B. Unit control circuit shall have a 24 volt transformer, sized sufficiently to operate the indoor fan.

C. All condenser fan motors and the secondary of each transformer shall be grounded.

## VIII. Accessories and Options

A. Head Pressure Control

Shall include a condenser fan motor and a pressure controller, allowing operation of the condensing unit down to 0°F.

## GUIDE SPECIFICATION - H*CE180 THROUGH 240 (cont'd)

B. Coil Guard

Field installed decorative grille shall be placed on the units to provide further coil protection.

D. Phenolic Coating on Condenser Coil

Condenser coils shall be dipped in a four-coat phenolic coating process to provide longer life in corrosive conditions.

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